CLAIMS

What is claimed is:

1.   A system for performing refresh operations, the system comprising:

a base table having a first plurality of data entries;

a first materialized view that comprises a second plurality of data entries, the second plurality of data entries being associated with the first plurality of data entries in the base table;

a refresh log that contains a plurality of changes in the base table; and

a module adapted to perform a refresh operation on the first materialized view using the second plurality of data entries, the module configured to;

access the refresh log and the first materialized view;

calculate a plurality of delta values from the plurality of changes in the refresh log and the second plurality of data entries in the first materialized view;

apply the plurality of delta values to the second plurality of data entries in the first materialized view; and

provide the plurality of delta values to a delta adaptation module for updating a second materialized view.

2.   The system set forth in claim 1, comprising a delta calculation module ("DCM") and a delta processing module ("DPM") in the module, wherein the DCM calculates the plurality of delta values and the DPM directs a plurality of operators based upon the plurality of delta values.

3.   The system set forth in claim 2, wherein the first plurality of data entries and the second plurality of data entries each include one of a plurality of grouping identifiers that associate each of the first plurality of data entries with the second plurality of data entries.

4.   The system for refreshing the table set forth in claim 3, wherein the DCM utilizes the plurality of group identifiers to combine the second plurality of data entries with the plurality of changes.

5.   The system set forth in claim 1, wherein the second plurality of data entries each comprises a grouping field and a count field.

6.   A system for performing a pipelined refresh, the system comprising:

a first materialized view derived at least partially from a base table;

a refresh log having a plurality of entries, each of the plurality of entries corresponding to a change in the base table,

a second materialized view derived at least partially from the first materialized view;

a refresh module that comprises;

        a first delta calculation module that calculates a plurality of delta values that represents the changes to the first materialized view;

        a first delta processing module that applies the plurality of delta values to the first materialized view;

        a delta adaptation module that receives the plurality of delta values from the first delta calculation module and calculates a plurality of changes to the second materialized view;

a second delta calculation module that obtains the plurality of changes to the second materialized view from the delta adaptation module; and

a second delta processing module that applies the plurality of changes to the second materialized view from the second delta calculation module to the second materialized view.

7. The system set forth in claim 6, wherein the plurality of entries in the refresh log correspond to a plurality of first materialized view entries in the first materialized view through a plurality of grouping identifiers that associate each of the plurality of entries with the plurality of first materialized view entries.

8. The system set forth in claim 6, comprising a plurality of operators utilized by the first delta processing module to modify the first materialized view based upon the plurality of delta values.

9. The system set forth in claim 6, wherein the second delta calculation module is configured to calculate a plurality of second materialized view delta values from the plurality of changes and deliver the plurality of second materialized view delta values to the second delta processing module.

10. The system set forth in claim 9, wherein the second delta processing module is configured to utilize the plurality of second materialized view delta values to apply the plurality of changes to the second materialized view.

11.   A system for performing a refresh operation, comprising:

means for deriving a first materialized view from at least one base table;

means for accessing a refresh log and the first materialized view to perform the refresh

operation on the first materialized view;

means for calculating a plurality of delta values by combining a plurality of changes in

the refresh log and a plurality of entries in the first materialized view;

means for applying the plurality of delta values to the first materialized view; and

means for providing the plurality of delta values to a delta adaptation module for

refreshing a second materialized view.

12.   A method of performing a refresh operation, the method comprising:

deriving a first materialized view from a base table;

obtaining a refresh log and the first materialized view to perform the refresh operation

on the first materialized view;

calculating a plurality of delta values by combining a plurality of changes in the

refresh log and a plurality of entries in the first materialized view;

applying the plurality of delta values to the first materialized view; and

providing the plurality of delta values to a delta adaptation module for refreshing a

second materialized view derived from the first materialized view.

13.   The method set forth in claim 12, wherein obtaining and calculating are

performed in a database management system ("DBMS").

14.   The method set forth in claim 12, wherein applying the plurality of delta values comprises utilizing a plurality of operators to modify the first materialized view.

15.   The method set forth in claim 12, comprising providing the plurality of delta values to a delta processing module that applies the plurality of delta values to the first materialized view.

16   The method set forth in claim 12, comprising:

processing the plurality of delta values in the delta adaptation module to create a plurality of second materialized view changes for the second materialized view;

calculating a plurality of second materialized view delta values that represent the plurality of second materialized view changes to be applied to the second materialized view; and

applying the plurality of second materialized view changes to the second materialized view.

17.   The method set forth in claim 16, comprising combining a tuple table with the plurality of delta values and projecting the plurality of second materialized view changes based upon the tuple table and the plurality of delta values.

18.   The method set forth in claim 16, wherein calculating the plurality of second materialized view delta values that represent the plurality of second materialized view

changes to be applied to the second materialized view does not involve accessing a refresh log for the second materialized view.

19.   The method set forth in claim 12, wherein the method is performed in the recited order.

20.   A computer program, comprising:

a machine readable medium;

a refresh log stored on the machine readable medium, the refresh log containing a plurality of change entries; and

a refresh manager stored on the machine readable medium, the refresh manager being adapted to refresh a first materialized view derived at least in part from a base table by computing a plurality of delta values in a delta calculation module based on the refresh log and the first materialized view, applying the plurality of delta values in a delta processing module to the first materialized view, and providing the plurality of delta values to a delta adaptation module derived from the first materialized view.

21.   The computer program set forth in claim 20, wherein each of the plurality of change entries comprises a group identifier.

22.   The computer program set forth in claim 20, wherein the delta calculation module combines the plurality of change entries and a plurality of entries in the first materialized view to create the plurality of delta values.